

8.5/10

Q1. True/False

(5 marks)

- True 1. The relational algebra is a high-level procedural language that can be used to tell the DBMS how to build a new relation from one or more relations in the database.
- True 2. The Relational Calculus is a declarative, non-operational formalism that lets users describe what they want, rather than how to compute it.
- False 3. The five fundamental operations in relational algebra are: union, Cartesian product, projection, intersection and selection.
- True 4. All relational algebra operations require that the relations involved in the operation are *union-compatible*.
- False 5. The main difference between Relational algebra and relational calculus is that relational algebra has the closure property while the relational calculus lacks that property.

Q2. Consider the following relational schema describing a movie database. A movie is directed by only one director but can be produced by several Producers. A spectator may like a movie without having seen it.

SCHEDULE

Theater	Title	Time
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MOVIES

Title	Director	Actor
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PRODUCED

Producer	Title
----------	-------

SEE

Spectator	Title
-----------	-------

LIKED

Spectator	Title
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1. List the theater name and time where I can see the movie "Shrek" after 3pm. (1.5 marks)

$\Pi_{Theater, Time} (\sigma_{Title = 'shrek' \text{ and } Time > 3pm} (SCHEDULE))$

1.5

2. List the producers who produced a movie that does not appear in a theater. (1.5 marks)

Pro $\leftarrow \Pi_{Title} (PRODUCED)$

SCH_(t) $\leftarrow \Pi_{Title} (SCHEDULE)$

tepm $\leftarrow SCH - Pro$

res $\leftarrow tepm \times PRODUCED$

$\Pi_{Producer} (\sigma_{Title \neq t} (res))$

3. Q3. List people who liked movies that they have not seen. (2 marks)

NOTSEEN $\leftarrow LIKED - SEE$

$\Pi_{spectator} (NOTSEEN)$

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